CLAIMS

1. A brushless motor comprising:

a stator; and

a rotor having a lateral surface opposed to said stator, wherein said stator includes:

a plurality of radially extending iron cores, and

a plurality of windings for respectively generating magnetic fields in said iron cores, and

wherein said rotor includes:

a plurality of permanent magnets, and

magnetic force line induction bodies located between said permanent magnets and said lateral surface.

2. A brushless motor according to claim 1, wherein an output torque T is given by a following equation:

$$T = p\{\phi \cdot I_a \cdot \cos(\beta) + (L_q - L_d) I_a^2 \cdot \sin(2\beta)/2\},$$

where

p: Number of Pole Pairs (Number of Poles /2)

ϕ: Maximum armature flux linkage of the permanent magnet

I_a: Armature current

β: Phase of armature current

L_d: Direct-axis inductance

(Inductance in the d-axis direction)

L_q: Quadrature-axis inductance

(Inductance in the q-axis Direction)

while the following equation:

$$L_q \fallingdotseq L_d,$$

does not hold.

3. A brushless motor according to claim 1, wherein said rotor has holes into which said permanent magnets are inserted in an axis direction of said rotor.

4. A brushless motor according to claim 1, wherein three-phase direct currents are provided for said plurality of windings.

5. A brushless motor according to claim 4, wherein said plurality of windings include:

a first set of windings, and

a second set of windings, and

wherein said first set of three-phase windings and said second set of three-phase windings are arranged to be symmetrical with respect to a line.

6. A brushless motor according to claim 4, wherein said windings includes:

a first group of three-phase windings, and

a second group of three-phase windings, and

wherein windings having said same phase of said first and second groups of three-phase windings are adjacent to each other in the same rotation direction, and

wherein said first group of three-phase windings include:

a first set of three-phase windings, and

a second set of three-phase windings, and said first set of three-phase windings and said second set of three-phase windings are arranged to be approximately geometrically symmetrical with respect to a line, said second group of three-phase windings include another first set of three-phase windings and another second set three-phase windings, and said other first set three-phase windings and said other second set of three-phase windings are arranged to be approximately geometrically symmetrical with respect to a line.

7. A brushless motor according to claim 1,

wherein a number of said windings is N, and a number of said permanent magnets is P, and said P is greater than said N.

8. A brushless motor according to claim 7, wherein one of prime factors of said P is greater than any of prime factors of said N.

9. A brushless motor according to claim 8, wherein said prime factors of said N includes 2 and 3, and

said prime factor of said P includes 2 and 7.

10. A brushless motor according to claim 7, said P satisfies an equation:

$$12 \leq P \leq 30.$$

11. A brushless motor according to claim 7, wherein said N is 12 and said P is 14.

12. A brushless motor according to claim 7, wherein a section of said permanent magnet on a flat plane vertical to a central axis of said rotor is rectangular,

said rectangle has short sides and long sides longer than said short sides, and

said long sides are opposed to said lateral surface.

13. A brushless motor according to claim 1, wherein said permanent magnet has a shape of a substantially rectangular parallelepiped, and

a distance d between a center of said rotor and magnetic pole surfaces opposed to said lateral surface among surfaces of said plurality of permanent magnets satisfies a following equation:

$$d \leq r - D/10,$$

where

$$D = 2\pi r / P,$$

r: radius of said rotor, and

P: number of said permanent magnets.

14. A brushless motor according to claim 1, wherein a following equation:

$$0 \leq (L_q - L_d) / L_d \leq 0.3,$$

holds where

L_q: quadrature axis inductance of said rotor, and

L_d: direct axis inductance of said rotor.

15. A brushless motor according to claim 1, wherein said magnetic force line inducing bodies

include a direct axis magnetic force line inducing body for inducing magnetic fluxes in the direct axis direction of said rotor, and

wherein a gap extending in the quadrature-axis direction of said rotor is formed in said rotor.

16. A brushless motor according to claim 15, wherein a following equation:

$$0 \le (L_q - L_d) / L_d \le 0.3,$$

holds where

L_q: quadrature axis inductance of said rotor, and

L_d: direct axis inductance of said rotor.

17. A motor drive vehicle comprising:

drive wheels;

said brushless motor according to any one of claims 1 to 16, wherein said rotor included in said brushless motor drives said drive wheels; and

a power supply voltage supplier for supplying a power supply voltage to said brushless motor.

18. An electric car comprising:

drive wheels;

said brushless motor according to any one of claims 1 to 16, wherein said rotor included in said brushless motor drives said drive wheels;

a power supply voltage supplier for supplying a power supply voltage to said brushless motor, on the basis of a movement of an accelerator pedal.

19. An electric train comprising:

drive wheels;

said brushless motor according to any one of claims 1 to 16, wherein said rotor included in said brushless motor drives said drive wheels;

a power supply voltage supplier for supplying a power supply voltage to said brushless motor, on the basis of a movement of a throttle lever.